



D3.7 PoliRural GitHub Account

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Every effort has been made to ensure that all statements and information contained herein are accurate, however the PoliRural Project Partners accept no liability for any error or omission.

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Executive Summary

Depopulation, land abandonment and the loss of biodiversity in rural areas are changes that may proceed very slowly yet are often irreversible. In order for policymakers to solve these challenges, they need to know if current policy instruments are effective, who is benefiting from them and in what measure, what driving forces will be most influential and how they will affect the people, and the planet.

PoliRural is a research and innovation project designed to advance rural policy development in the age of disruptive data and technologies in order to deliver a trusted, scalable and transferable solution for policy co-creation.

PoliRural wants to know what effect the policies that are currently being implemented in rural areas are having and, in some way, doing a prospecting exercise to predict which of these policies are going to have continuity on the future. All this process brings together decision makers, experts and rural inhabitants using **advanced policy simulation tools** to better understand and tackle regional challenges. Among these innovative tools are **Digital Innovation Hub** and **System Dynamics models**.

This document provides the reader an overview of the implementation of the *T3.5 Final integration, Release & Licensing* task, which is framed within the *WP3 Innovation Hub & System Dynamics Technology* work package.

WP3 oversee the development and integration of the technical outputs:

- The Innovation Hub platform has been built mainly to publish all Polirural's results for further exploitation by the community. The purpose of the hub is both, to educate and disseminate.
- The System Dynamics tool has been developed to evaluate policy impacts under different scenarios.

Innovation Hub & System Dynamic tools help PoliRural to be conceived as a policy co-design exercise through the creation of a reusable framework to deliver more accurate foresight for rural regions and to contribute to new and enhanced policy interventions.

With all this support, PoliRural aims to make rural areas and professions more attractive for established populations and recent or potential newcomers.

To ensure open access to the Innovation Hub and System Dynamic tool, task T3.5 involve two tracks:

- ✓ Develop an Open Source solution conducive to long-term post-project exploration from the advanced Stella models.
- ✓ To publish both Innovation Hub and System Dynamic Open source tool source code on GitHub.

1 Introduction

The main tasks of *T3.5 Final Integration, Release & Licensing* are integrating the front-end of Stella Model (*Systems Thinking, Experimental Learning Laboratory with Animation*, Visual programming language for System Dynamics modelling) into the hub and that of OS solution and publishing both, the *Hub platform* and *System dynamics* model OS tools' source codes under the appropriate licence on GitHub.

As stated by the OpenAIRE project in the Guides for Researchers, by default Horizon 2020 projects participate in the *Open Research Data Pilot* (ORDP) must deposit the following data in a research data repository:

1. All data needed to validate the results presented in scientific publications, including the metadata that describe the research data deposited. This is called the “underlying data”. These data must be deposited as soon as possible.
2. Any other data (for instance curated data not directly attributable to a publication, or raw data), including the associated metadata, as specified and within the deadlines laid down in the Data Management Plan – that is, according to the individual judgement by each project/grantee.
3. Projects should also provide information via the chosen repository about the tools that are needed to validate the results, e.g., **specialised software or software code**, algorithms, and analysis protocols. Where possible, they should provide these instruments themselves, or alternatively, provide direct access to them.

In the [Guidelines on FAIR Data Management in Horizon 2020](#)¹, the European Commission states: “Where will the data and associated metadata, documentation and code be deposited? Preference should be given to certified repositories, which support open access where possible.

Chapter 2 presents the process of converting the System Dynamics models created with Stella Model into an Open Source solution.

Chapter 3 describes the creation of the PoliRural Organization in GitHub where to publish the source code of both Digital Innovation Hub and System Dynamics source codes.

¹ https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-data-mgt_en.pdf

2 Integration of OS SD models into the DIH

System Dynamics modelling is predominantly an expert domain where experts build models and execute models on behalf of other parties who use the simulations as part of their processes. Models are executable on the web through vendor-operated portals like Isee Exchange, the web companion to the Stella suite of SDM tools. Here, models can be hosted and run free of charge, provided the models are open to all.

This naturally puts an effective cap on the scalability of SDM solutions. Models often incorporate sensitive data, and the result of the model may in many cases be part of the unique value proposition of a service delivery concept. Thus, keeping the models open is in many cases not an option.

PoliRural has implemented a set of software components that allow the execution of arbitrary SDM models available in the SDM interchange format XMILE through a web API.

The components include:

- A converter tool that translates XMILE files to Python classes using the Open Source SDM library Pysd
- A generic Open API wrapper that allows execution of SDM models passing JSON requests as input and receiving JSON as data responses. This API implements basic security.
- An end-user application written in HTML5 and asynchronous JavaScript that provides an end-user interface for users to interact with models, configure the parameters to be used for execution and interpret data.

This tool is available through GitHub repositories described in this document in chapter 3. The Policy Options Explorer is also made available at the web address <https://polirural-sdm.avinet.no>. This is furthermore linked from and described on the PoliRural Digital Innovation Hub, whereby it is accessible to all PoliRural stakeholders. Interested parties may login to the tool using the credentials username: “demo”, password: “demo”. This will provide limited access to execute and see the output of PoliRural pilot’s system dynamics models in a “sand boxed” environment where it is safe to experiment without interfering with operational models.

The tools are developed in Python 3 on the server side, the Open API implemented using the Flask framework. On the client side, the sample application PoliRural Policy Options Explorer is developed using the JavaScript development framework React with Node Package Manager and create-react-app as tooling.

Taking as a starting point the source code, any interested party may boot up their own instance of the API and client app. This is also permitted by the licenses applied to the software.

3 Implementation of PoliRural in GitHub

GitHub is a collaborative and web-based version control platform that lets mainly managing software for Open Source projects.

The PoliRural GitHub organization where to publish the source code of Digital Innovation Hub and System Dynamics Open source code is the following one: <https://github.com/polirural>.

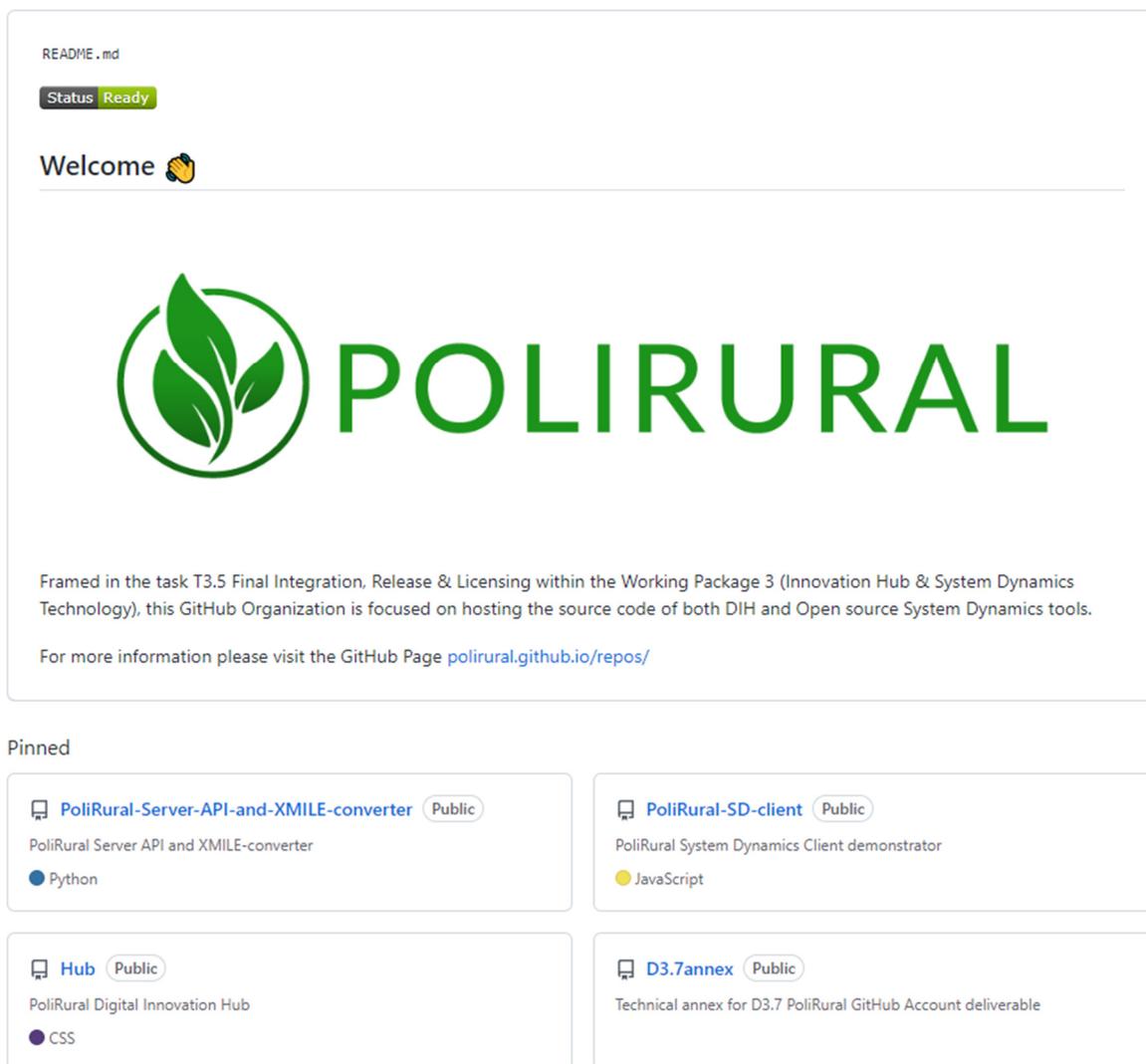


Figure 1 PoliRural GitHub Organization

All members can collaborate in repositories and projects, but only organization owners and security managers can manage the organization's settings and control access to its data using sophisticated security and administrative features.

To confirm the GitHub organization's identity² the *polirural.eu* ownership has been verified as it can be seen in the label of the head.

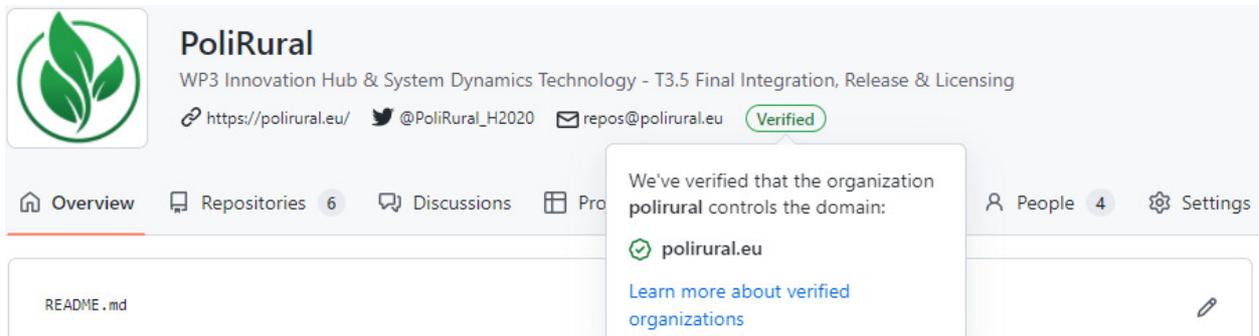


Figure 2 PoliRural GitHub Organization identity

In the context of PoliRural, the GitHub repositories contained in this organization are public, that is freely visible to all.

- **Hub:** This repository contains the source code of PoliRural Digital Innovation Hub

README.md

Licensing LGPLv2.1 Project Digital Innovation Hub

Digital Innovation Hub

The aim of the Polirural Innovation Hub is to offer a public user interface and introduction to the innovations of the project. It will be a central and virtual space, where all stakeholders (policymakers, public servant, regional development agencies, NGO, citizens, scientists, developers, data experts, planners) will meet and share their needs and achievements to improve policy and decision-making on local, regional and eventually national level. The core of the Innovation Hub will be the Digital Innovation Hub platform, which will support the sharing of information with other projects and initiatives. [Read more.](#)

[Official website](#)

Figure 3 DIH public repository

- **PoliRural-Server-API-and-XMILE-converter:**

This repository contains the source code part of the translation tool from XMILE (XML Interchange Language) to Python. The XML Interchange Language (XMILE) for System Dynamics (SD) defines an open XML protocol for the sharing, interoperability, and reuse of SD models and simulations. Python is developed under an OSI-approved open-source license making it freely usable and distributable, even for commercial use.

² <https://docs.github.com/en/enterprise-cloud@latest/organizations/managing-organization-settings/verifying-or-approving-a-domain-for-your-organization>

PoliRural Server API and XMILE converter

This repository contains the source code and XMILE source models for the PoliRural server API that sits behind the PoliRural Policy Options Explorer, an innovative system dynamics model web execution framework permitting use of SDM models outside proprietary software.



Figure 4 XMILE to python converter

➤ PoliRural-SD-client:

This repository contains the source code part of the end-user application.

The purpose of this tool is to make the most of non-experts' access to System Dynamics simulations involved in foresight analysis, policy and strategy formulation for rural communities.

The Policy Options Explorer, the end-user application which lets the users to experiment with the PoliRural models, can be accessible from the Digital Innovation Hub in this link <https://hub.polirural.eu/ra-explorer/#/policy-options-explorer>. The access to the tool is in the link [Open the Policy Options Explorer \(opens a new browser window\)](#). The credentials (username/password) are demo/demo.

PoliRural Policy Options Explorer

The PoliRural Policy Options Explorer is a demonstrator application that shows the potential of using SDM models outside the confines of vendor-provided, restricted or impermissively costly execution environments.

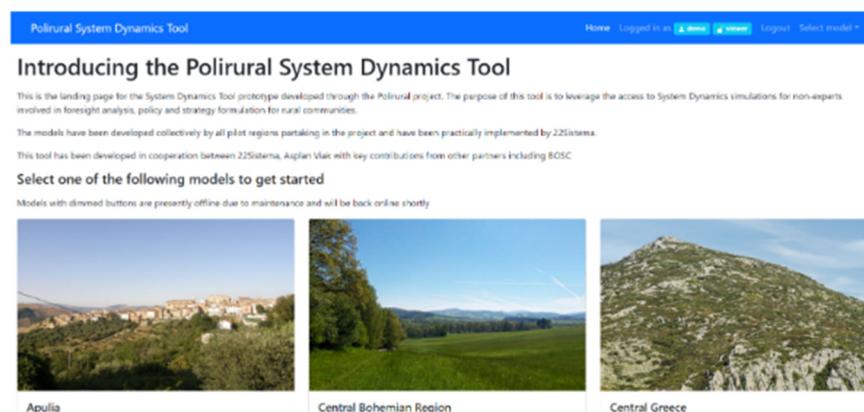


Fig. 1: PoliRural Policy Options Explorer landing page

Figure 5 SDM client

- **Repos:** This repository holds the PoliRural GitHub Page (<https://polirural.github.io/repos/>) that contains information about the PoliRural project and its repositories to interested users.

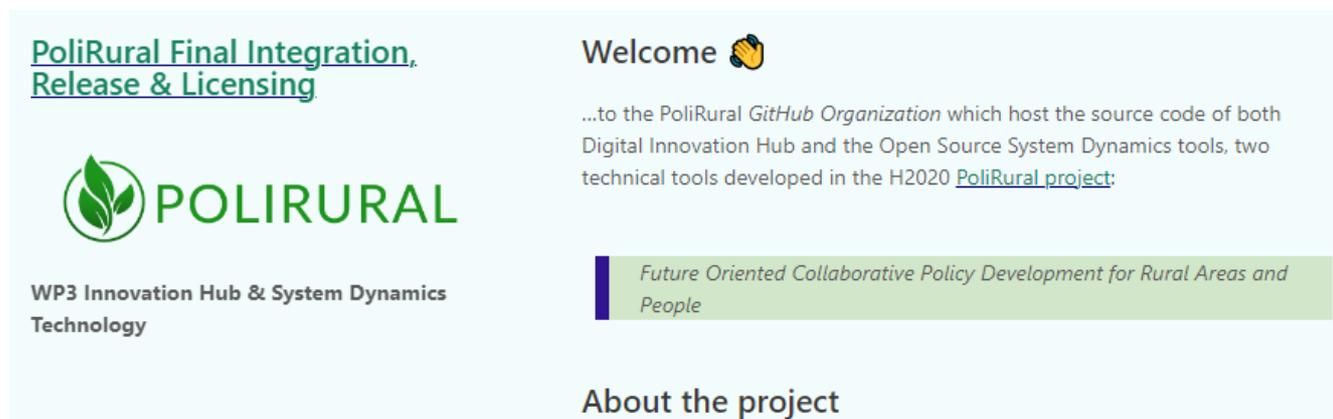


Figure 6 General overview of the project and guide to public repositories

- **D3.7annex:** This technical repository contains that document that compiles additional information on GitHub to let the reader learn more about the basic essentials of GitHub.

GitHub Fundamentals. OpenAIRE & Zenodo infrastructures

September 2022

Status Published Document docx Document PDF

This repository contains a technical annex for the deliverable D3.7 PoliRural GitHub Account.



Figure 7 Technical annex repository

- **.github:** This repository is created by default by the platform to contain the organization front page readme file.

In terms of using the software, licensing is a tacit agreement by which the owner of the data and the person who is going to use it establish permissions to distribute, use or modify the source code.

The licenses established in PoliRural GitHub are as follows:

Repository	Type of license	Rights
Hub	GNU GPL v2.1	Robust open source software license: The same terms and restrictions of the original license must be applied to derivative works or modifications made to the original program.
PoliRural-SD-client	GNU GPL v3.0	Robust open source software license: The same terms and restrictions of the original license must be applied to derivative works or modifications made to the original program.
PoliRural-Server-API-and-XML-converter	GNU GPL v3.0	Robust open source software license: The same terms and restrictions of the original license must be applied to derivative works or modifications made to the original program.
Repos	MIT License	Permissive open source software license: A derivative work may be produced with no requirement for protection.
D3.7annex	MIT License	Permissive open source software license: A derivative work may be produced with no requirement for protection.
.github	MIT License	Permissive open source software license: A derivative work may be produced with no requirement for protection.

Table 1 – OS licenses used in public repositories

The account repos@polirural.eu is available for those who want to communicate with the PoliRural GitHub repository managers.

4 Conclusions

Open Access is the practice of providing online access to scientific information that is free of charge to the user and is reusable. Making research results more accessible to all contributes to better and more efficient science, and to innovation in the public and private sectors.

A shift towards a more open, collaborative, and networked way of doing research is a phenomenon that is needed and of which Open Access is a crucial element.

For the European Commission is now an obligation the Open Access for research data, all scientific outputs and software.

The Open Research Data Pilot (ORDP) of the European Commission enables Open Access and Reuse of research data generated by Horizon 2020 projects. It is mandatory deposit the data in a research data repository ensuring third parties can freely access, mine, exploit, reproduce and disseminate those data.

According to the Open Science policy, Open Source software is incredibly important for the future of science.

It is central to mention the importance of balancing openness in a responsible manner with the protection of scientific information, commercialization and intellectual property rights (IPR), licensing agreements, privacy concerns, and security, as well as questions of data management and preservation.

As mentioned in deliverable D8.2 (Data Management Plan), the PoliRural project is providing its research results as immediate open access on the “[PoliRural Community](#)”³ on the EU Commission / CERN Zenodo Open Access Repository. [Zenodo](#)⁴ is a research data general-purpose open access repository. It was created by the OpenAIRE EU project and CERN to provide a place for researchers to deposit datasets. It was launched in 2013 and is integrated with GitHub to make code hosted in GitHub citable.

As the more popular software repository for Open Source projects, the use of GitHub and Zenodo in the context of OpenAIRE grants the European Open Science standards and policies respect to research outputs. Its application in current (and future) projects might contribute to the promotion of Open Science and the dissemination of scientific discoveries to society.

³ <https://zenodo.org/communities/?p=polirural>

⁴ <https://www.zenodo.org/>

5 Annexes

5.1 Annex I: GitHub Fundamentals. OpenAIRE & Zenodo infrastructures

This document explains how the interaction of GitHub with the European OpenAire infrastructure, especially through Zenodo repository, is so important for the future of science by allowing access to all kinds of documentary materials and other products resulting from research projects and academic activities. The document may be accessed and/or downloaded through below repository:

- <https://github.com/polirural/D3.7annex>

5.2 Annex II: Licensing

Currently there are about one hundred open source licenses in the market, and choosing one is not easy, actually may become a critical task that might compromise the whole project. As far as an in deep analysis of the process of licensing is out of the scope of this deliverable, this annexe is designed to get a quick view of the current state of the art in the field.

This licensing spectrum focused is explained in the following image:

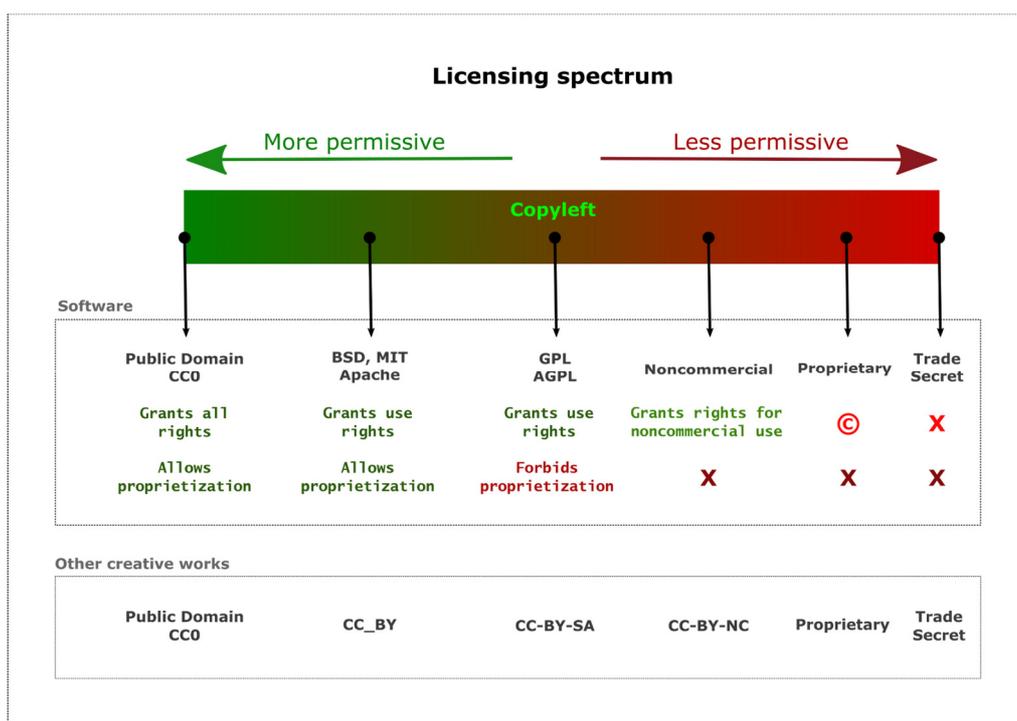


Figure 8 Example of basic licensing spectrum (Adapted from [Permissive software license](https://en.wikipedia.org/wiki/Permissive_software_license) ⁵)

⁵ https://en.wikipedia.org/wiki/Permissive_software_license

Example of free and open-source software (FOSS) license compatibility schema:

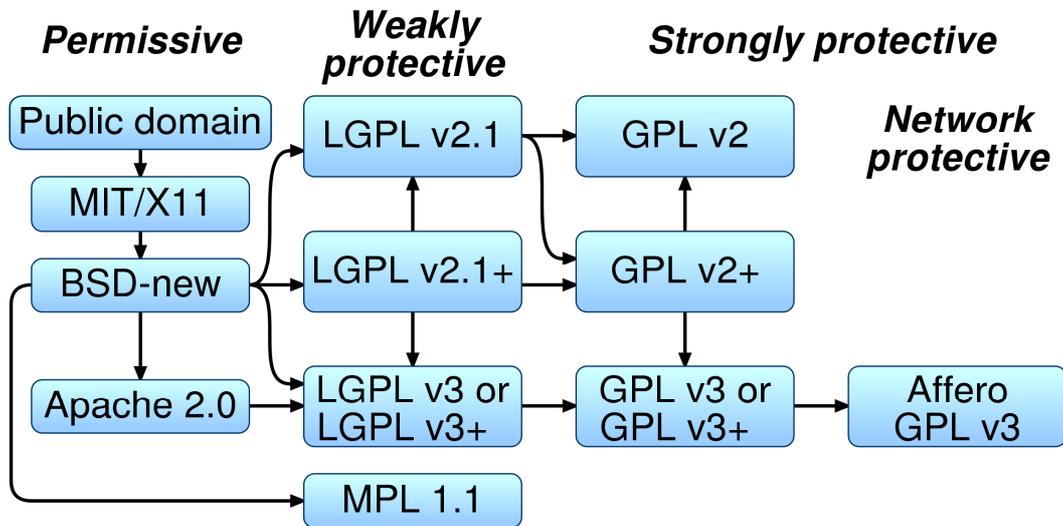


Figure 9 Floss-license-compatibility (Source: [Wikimedia Commons](#)⁶)

As far as the technical outputs depend themselves for other components that might be (or might be not) more or less permissive, we need take note of backwards compatibility.

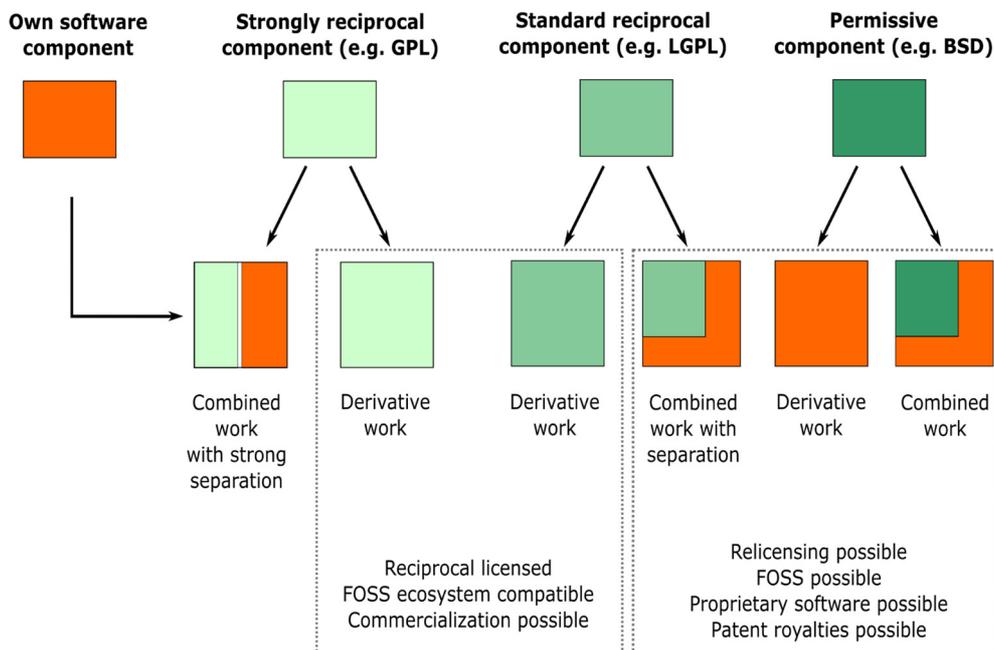


Figure 10 Software license compatibility for derived works (Source: [Wikimedia Commons](#)⁷)

⁶ <https://commons.wikimedia.org/wiki/File:Floss-license-slide-image.svg>

⁷ <https://commons.wikimedia.org/wiki/File:Software-license-compatibility-graph.svg>

5.3 Annex III: Project sites

- [PoliRural](#) - *Future Oriented Collaborative Policy Development for Rural Areas and People*
- [Digital Innovation Hub](#) – *Social Space for Smart Regions*
- [PoliRural GitHub Organization](#) - *WP3 - Final Integration, Release & Licensing.*

The public repositories are available here:

- [Pysd Polirural Server](#)
- [PoliRural SD client](#)
- [Digital Innovation Hub](#)